

Soil Sponges

Topic: Land and Soil

Objectives: Observe the flow of water through different soils

Grade Level: all

Time: 15 – 20 minutes

Vocabulary:
run-off
water table
compacted
filter

Materials: digging trowels, 1 liter plastic bags, stick-on labels, sand, prepared potting soil, 2 liter clear plastic soft drink bottles, 500 ml beakers, fine mesh screening, marking pens, pitchers for water, watch with second hand, writing pads, pens or pencils

Location: Magnolia Hall Courtyard and various locations in Piedmont Park

Background: When rain falls on the ground, some of it soaks into the soil and some flows off the soil surface as run-off. Some of the rain that soaks into the soil filters down through the ground to the water table. But some rainwater is absorbed and held in the soil similarly to the way water is held in a sponge. How much water runs off the soil's surface and how much is held or filters through the soil depends on such things as the size or structure of the soil particles and how tightly compacted the soil particles are. In this activity, you will observe how quickly water flows through different soil samples and how much of the water is absorbed by the soil.

Advance Preparation: Remove the labels and the bottle tops from the plastic soft drink bottles. There should be about one bottle for every three students in the group plus two more bottles. Use the marker and the stick-on labels to label one of the bottles "sand" and one "potting soil." Cut off the bottoms of the bottles and place a circle of screening inside each bottle. Cover the screening with 3 to 4 cm (about 1 inch) of sand. Rest the bottles, upside down, on 500ml beakers. Pour 1 liter of the prepared potting soil into the bottle marked "potting soil" and pour 1 liter of sand into the bottle marked "sand."

Procedure:

1. Together with two of your classmates, obtain a digging trowel and a one-liter plastic bag from your teacher or activity leader. Think of a name for your team.
2. Collect one liter of soil from a location in Piedmont Park. Try to find a different place to collect your soil than other teams have found so that there is a variety of soil types for the experiment.

3. After you have collected your bag full of soil, pour the liter of soil into one of the unmarked upturned bottles. Use the marking pen and a stick-on label to mark the bottle with your team's name.
4. Pour 300 ml of water in a beaker, but do not pour the water into your plastic soda bottle yet.
5. After every team has filled their bottle with their soil, look at the different soils in all the bottles.
6. Guess which soil sample water will pass through fastest. Which soil sample will hold the most water? Which will have the most water pooled on top. Write down your guesses.
7. When your teacher says "Go!" pour the 300ml of water into your team's bottle as the other teams pour 300 ml of water into their bottles. Your teacher will count off the seconds. Write down how long it takes for the first drops of water to filter through your team's soil sample.
8. Observe how rapidly or slowly the water passes through the different soil samples.
9. After the water has stopped flowing through the soil, observe how much of the original 300 ml of water has collected in the beakers below the bottles of different soils.

Questions to think about and discuss:

1. Compare the times it took the first drops of water to flow through the various soil samples. Through which team's soil did the water flow the fastest? Which was the slowest? Which soil samples have water pooled on top? How do your observations compare to your original guesses?
2. Compare the amount of water that flowed through the soil samples. How much of the original 300ml of water filtered through the various soils? Which team's soil absorbed the most water? Which sample absorbed the least water? Which soil sample made the best sponge?
3. Think about your observations of the various soil samples. Discuss which team's soil would be best to use for a garden. Whose soil would you want in a playground? Which soil might you use for a driveway?